

CLAIMS:

1. A portable device for the delivery of inhalable medicament comprising
- 5 a monitor for monitoring the breath cycle of a patient;
- a medicament container having a release mechanism for releasing inhalable medicament therefrom; and
- 10 an actuator for actuating said release mechanism, said actuator being actuable in response to a signal from said monitor,
- characterized in that the monitor provides said signal at a trigger point which is coupled to the end of the exhalation part of the breath cycle.
2. A portable device according to claim 1, wherein said monitor comprises one or more sensors for sensing the pressure profile associated with the breath cycle.
- 20 3. A portable device according to either of claims 1 or 2, wherein said monitor comprises one or more sensors for sensing the airflow profile associated with the breath cycle.
- 25 4. A portable device according to any of claims 1 to 3, wherein said monitor comprises one or more sensors for sensing the temperature profile associated with the breath cycle.
- 30 5. A portable device according to any of claims 1 to 4, wherein said monitor comprises one or more sensors for sensing the moisture profile associated with the breath cycle.
- 35 6. A portable device according to any of claims 1 to 5, wherein said monitor comprises one or more sensors for sensing the oxygen or carbon dioxide profile associated with the breath cycle.

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7. A portable device according to any of claims 1 to 6, wherein the trigger point corresponds to the point at which the lungs of the patient are most empty.

8. A portable device according to any of claims 1 to 7, wherein said monitor is connectable to an electronic information processor.

9. A portable device according to claim 8, wherein said electronic information processor includes an active memory for storing information about the breath cycle.

10. A portable device according to claim 9, wherein said electronic information processor includes a predictive algorithm for predicting the optimum trigger point.

11. A portable device according to claim 9, wherein said electronic information processor includes a look-up table for predicting the optimum trigger point.

12. A portable device according to any of claims 9 to 11, wherein said electronic information processor includes a second predictive algorithm for predicting the optimum amount of medicament to release.

13. A portable device according to any of claims 9 to 11, wherein said electronic information processor includes a second look-up table for predicting the optimum amount of medicament to release.

14. A portable device according to either of claim 12 or 13, wherein said electronic information processor includes a dose memory for storing information about earlier delivered doses and reference is made to the dose memory in predicting the optimum amount of medicament to release.

15. A portable device according to any of claims 12 to 14, additionally comprising a display for displaying information about the optimum amount of medicament to release.

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cont. 16. A portable device according to any of claims 12 to 15, additionally comprising a selector for selecting the amount of medicament to release.

5 b 17. A portable device according to claim 16, wherein the selector is manually operable.

18. A portable device according to claim 16, wherein the selector is operable in response to a signal from the electronic information processor.

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19. A portable device according to any of claims 16 to 18, wherein the selector comprises a timing mechanism for varying the time interval of actuation of the actuator.

20. A portable device according to any of claims 16 to 19, wherein the selector comprises a metering mechanism between the container and the release mechanism for metering a variable quantity of medicament for release.

20 21. A portable device according to any of claims 16 to 20, wherein the selector comprises a multiple-fire mechanism for multiple actuation of the actuator, wherein each actuation releases a portion of the optimum amount of medicament.

25 22. A portable device according to any of claims 1 to 21, wherein said medicament container is an aerosol container and said release mechanism is an aerosol valve.

23. A portable device according to claim 22, wherein said aerosol valve includes a metering chamber for metering the release of medicament.

30 24. A portable device according to claim 23, wherein the metering chamber has a variable metering volume.

35 25. A portable device according to claim 24, wherein the metering chamber comprises a chamber of fixed volume which metering volume is variable by insertion of a plunger or piston.

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26. A portable device according to claim 24, wherein the metering chamber is formed from an expandable material.

5 27. A portable device according to claim 24, wherein the metering chamber has a telescopic or concertina arrangement.

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28. A portable device according to any of claims 1 to 21, wherein said medicament container is a dry-powder container or a liquid container.

29. A portable device according to any of claims 1 to 28, wherein said actuator comprises an energy store for storing energy which energy is releasable to activate the release mechanism of the medicament container.

30. A portable device according to claim 29, wherein said energy store comprises a biasable resilient member.

31. A portable device according to claim 30, wherein said biasable resilient member is a spring.

32. A portable device according to claim 29, wherein said energy store comprises a source of compressed fluid, preferably compressed gas.

33. A portable device according to claim 29, wherein said energy store comprises a voltaic cell or battery of voltaic cells.

34. A portable device according to claim 29, wherein said energy store comprises a chemical energy source, preferably a chemical propellant or ignition mixture.

35. A portable device according to claim 29, wherein said energy store comprises a physically explosive energy source.

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36. A portable device according to any of claims 1 to 35, additionally comprising a safety mechanism to prevent unintended multiple actuations of the actuator.

5 37. A portable device according to claim 36, wherein said safety mechanism imposes a time delay between successive actuations of the actuator.

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38. A portable device according to any of claims 1 to 37, additionally comprising an actuation counter.

39. A portable device according to any of claims 1 to 38, additionally comprising a medicament release counter, preferably a dose counter.

40. A portable device according to any of claims 1 to 39, additionally comprising a manual override.

41. A portable device according to any of claims 1 to 40 additionally comprising a housing therefor.

42. A method for the delivery of inhalable medicament to a patient by way of a portable device comprising

(i) monitoring the breath cycle of a patient by use of a monitor;

(ii) at a trigger point, sending an actuation signal from said monitor to an actuator;

(iii) on receipt of said actuation signal by said actuator, actuating the release of inhalable medicament to the patient,

characterized in that said trigger point is coupled to the end of the exhalation part of the breath cycle.

43. Method according to claim 42, wherein steps (i) to (iii) are repeated until the breath cycle corresponds to a medically acceptable form.

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44. Method according to claim 42, comprising

(i) monitoring a plurality of breath cycles of a patient by use of a monitor;

(ii) analysing said plurality of breath cycles to define an averaged breath cycle for the patient;

(iii) predicting a trigger point from said averaged breath cycle, the trigger point being coupled to the end of the exhalation part of the averaged breath cycle;

(iv) monitoring a further breath cycle and at said predicted trigger point sending an actuation signal from said monitor to an actuator;

(v) on receipt of said actuation signal by said actuator, actuating the release of inhalable medicament to the patient.

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